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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/696,017

10/29/2003

Leland Swanson

TI-36333

7074

23494

7590

08/04/2005

TEXAS INSTRUMENTS INCORPORATED

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EXAMINER

CLARK, JASMINE JHIHAN B

ART UNIT

PAPER NUMBER

2815

DATE MAILED: 08/04/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/696,017

Applicant(s)

SWANSON ET AL.

Examiner

Jasmine J. Clark

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 27 July 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) \_\_\_\_\_ is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 5,7-12,15 and 17-20 is/are rejected.
- 7) ☒ Claim(s) 6 and 14 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

**DETAILED ACTION**

1. The indicated allowability of claims 2-7, 10-12, 14-15, and 17-20 is withdrawn in view of the newly discovered reference(s) to Sakuyama et al. (US 6,580,169 B2) and Sahara et al. (US 4,764,804). Rejections based on the newly cited reference(s) follow.

***Claim Rejections - 35 USC § 112***

2. Claims 5, 7-9, and 17-20 recite(s) the limitation "the substrate" in line 5(eg., in claim 5). There is insufficient antecedent basis for this limitation in the claim. Similar to claim 5 are claims 7-9, and 17-20.

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

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consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 5, 10-12, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakuyama et al. (US 6,580,169 B2).

Concerning claim 10, Sakuyama teaches a semiconductor device comprising a first plurality contacts (see Fig. 17, eg.) 10a" and a second plurality contacts 10b"; a first plurality of conductive bumps Ba" wherein at least one bump in the first plurality is conductively connected to at least one of the plurality of electrical contacts 10a"; a second plurality of conductive bumps Bb", wherein at least one bump in the second plurality is conductively connected to at least one of the plurality of electrical contacts 10b"; and wherein the size of the first plurality of bumps Ba" is larger than the size of the second plurality of conductive bumps Bb". However, the applied reference fails to teach and/or suggest wherein the average size of the first plurality of conductive bumps Ba" is at least 20% larger than the average size of the second plurality of conductive bumps Bb".

Hence, it would have been an obvious design choice bounded by well known manufacturing constrains and ascertainable by routine experimentation and optimization to choose these particular dimension because the applicants have not disclosed that the dimension are for a particular unobvious purpose, produce an expected result, or are otherwise critical, and it appears prima facie that the process would possess utility using another dimension. Moreover, it has been held that limitations directed to size configuration are prima facie obvious absent a disclosure that the limitations are

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particular unobvious purpose, produce an unexpected result, or otherwise critical. See, for example, *In re Rose*, 220 F. 2d 459, 105 USPQ 237 (CCPA 1955).

Concerning claim 15, the applied reference teaches a method of making a semiconductor circuit, comprising:

Providing a semiconductor die 7" (see Figs. 15-17) comprising a first plurality of electrical contacts 10a" and a second plurality of electrical contacts 10b";

conductively connecting to the die a 7" a first plurality of conductive bumps Ba" wherein at least one bump in the first plurality is conductively connected to at least one of the first plurality of electrical contacts 10a"

conductively connecting to the die 7" a second plurality of conductive bumps Bb", wherein at least one bump in the second plurality is conductively connected to at least one of the second plurality of electrical contacts 10b"; and

wherein the average size of the first plurality of conductive bumps is at least 20% larger than the average size of the second plurality of conductive bumps Bb", please the above discussion under claim 10.

4. Claims 7-12, 15, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sahara et al. (US 4,764,804).

Concerning claim 10, Sahara shows a structure of a semiconductor device, comprising (see Fig. 6) a semiconductor die 5 comprising a first plurality of electrical contacts 10 and a second plurality of electrical contacts 12; a first plurality of conductive bumps 8 wherein at least one bump in the first plurality is conductively connected to at

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least one of the first plurality of electrical contacts 10; a second plurality of conductive bumps 9, wherein at least one bump in the second plurality is conductively connected to at least one of the second plurality of electrical contacts 12. However, Sahara fails to teach wherein the average size of the first plurality of conductive bumps is at least 20% larger than the average size of the second plurality of conductive bumps. Please see the reasons in *In re Rose* above.

Concerning claim 7, Sahara shows a first built up layer 6 combination with 11 between the die 5 and the second plurality of bumps 9; a second built up layer 6 and 11 between a substrate 17 and the second plurality of bumps 9; and wherein the die 5 and substrate 17 are substantially parallel to one another. However, Sahara fails to teach and/or suggest wherein the substrate comprises a package type selected from the group consisting of, for example a ball grid array(BGA). Hence it would have been obvious to employ a BGA, as is notoriously known.

Concerning claim 9, wherein the substrate 17 further comprises a plurality of recessed holes, each hole adapted to accept one of the plurality of bumps 8 (see Fig. 6).

Concerning claims 11 and 12, please see *In re Rose*.

Concerning claims 15 and 20, please see the above discussion including the discussion in claim 7.

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5. Claims 6 and 14 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The applied reference(s) fail to teach and/or suggest wherein the first plurality of bumps 8 are substantially coplanar with the second plurality of bumps relative to the semiconductor die 5; and wherein the first plurality of bumps 8 are substantially coplanar with the second plurality of bumps 9 with respect to their opposite the surfaces of the die 5.

#### ***Telephone Inquiry Contacts***

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jasmine J. Clark whose telephone number is (571) 272-1726. The examiner can normally be reached on Flex.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (571) 272-1664. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jjbc/08/02/05

**JASMINE CLARK**  
**PRIMARY EXAMINER**

A handwritten signature in black ink, appearing to read "Jasmine Clark", is written below the printed name and title.